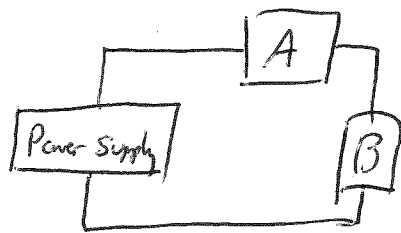
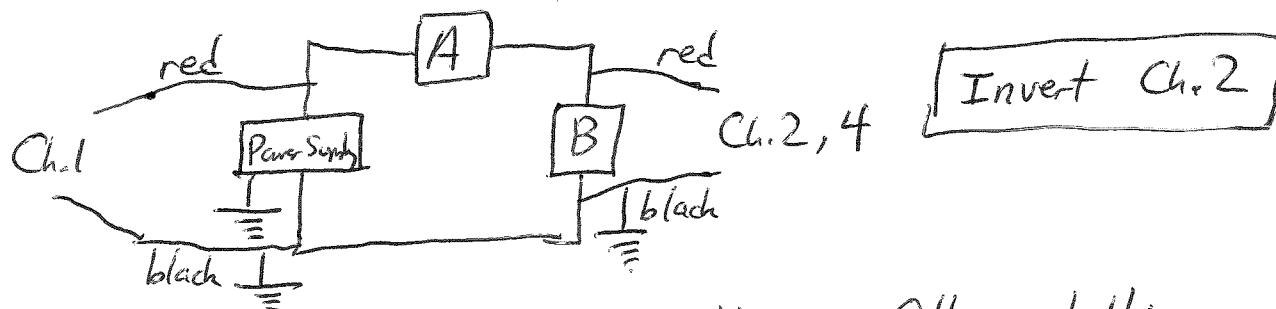


How to measure  $V_A$  and  $V_B$  on the oscilloscope in the following circuit:



Problem: Both the power supply "negative" terminal and the black wire for all oscilloscope channels connect to a common ground.

Solution: Use the following circuit:



With Ch.2 inverted (but not Ch.4!!), the following hold:

$$V_{ps} = V_{ch1} \quad \text{due to invert}$$

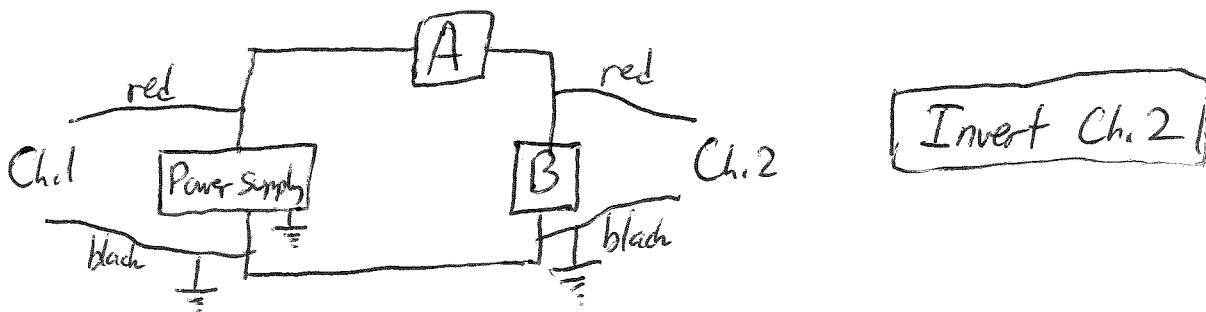
$$V_B = V_{ch4} = -V_{ch2}$$

$$V_A = V_{ps} - V_B = V_{ch1} + V_{ch2}$$

Pressing the "Ch1+2" button on channel one's controls will display  $V_{ch1} + V_{ch2}$ .

Note: This requires 4 BNC cables if the power supply uses a BNC cable.

If we are plotting  $V_A$  (y-axis) vs.  $V_B$  (x-axis), we can get by with one less cable:



Set x-deflection to Ch. 2 <sup>(-V<sub>B</sub>)</sup>, press Ch. 1+2 to display Ch. 1+Ch. 2 ( $V_A$ ) and turn off all individual channels.

On the surface, it would seem that this would plot  $V_A$  vs  $-V_B$ , but our oscilloscopes have the "feature" that x-deflection ignores the invert button, so  $V_A$  vs  $V_B$  is displayed instead.

How convenient!